Follow-up Audit
Water Services Department
Backflow Prevention Program

August 1999

City Auditor's Office

City of Kansas City, Missouri

989-032

August 30, 1999

Honorable Mayor and Members of the City Council:

This follow-up audit of the city's backflow prevention program was initiated by the city auditor pursuant to Article II, Section 13 of the City Charter. The follow-up report was initiated as part of the City Auditor's Office policy of determining department progress in improving program operations subsequent to issuance of our audit reports.

Our 1993 performance audit, *Water & Pollution Control Department Backflow Prevention Program* found that the department, now known as Water Services, was not effectively enforcing the state's backflow prevention regulation. We reviewed related literature and consulted industry experts to develop a list of key elements of a model program; our audit work determined that most of the elements were missing from the city's program, including accountability, public education, documentation of effort, and allowing for different levels of hazards. In addition, the original audit found that lawn irrigation systems were unregulated and some city departments were not in compliance with backflow prevention regulations.

This follow-up audit sought to determine how successful the department has been in addressing the inadequacies with the city's backflow prevention program, by comparing current efforts to the model backflow program elements. We found that a backflow prevention program has been developed and a program manager has been hired. Many of the elements of a model program are in place, including appropriate legislative authority, adequate staff training, public education, and record-keeping. Determining which existing industrial facilities should have backflow devices installed is proceeding as recommended.

In addition, we found other elements of a model backflow program that have been addressed but still need minor improvement. The process for identifying devices due for annual testing should be automated and more coordination is needed between the Water Services and Codes Administration departments.

The follow-up also identified program elements and other activities that require significant attention by program staff. The Code of Ordinances still does not consider relative hazards in determining the requirements for new industrial facilities. Instead all new water service lines are required to include a backflow device, even when the potential for contamination of the public water supply is minimal or non-existent. Requiring all new facilities to install a device diverts program resources from those facilities that need devices to protect the city's water supply.

The program staff still needs to develop a written plan and timetable for ensuring compliance with the backflow requirements for residential accounts, particularly those with lawn sprinkler systems. We also found that enforcement efforts could be improved by developing an intermediate enforcement mechanism prior to shutting off water service. Reluctance on the part of program staff to shut off water service for those out of compliance may be at least partially responsible for the extent of non-compliance with annual testing requirements we found in city-owned facilities.

Finally, we found that while the Code of Ordinances allows facilities to be exempt from the backflow requirements, these exemptions must be reissued after three years. However, subsequent to our original audit, state regulations eliminated the need for re-issuance of the exemptions, relying instead on customer notification of changes in water service. This notification requirement, which also exists in the Code of Ordinances, should be sufficient to ensure the continued protection of the city's water supply.

The draft follow-up report was sent to the city manager, city attorney, and the directors of water services and codes administration on July 16, 1999. Written responses were received from the city manager and the directors of water services and codes administration and are included as appendices. We appreciate the courtesy and cooperation extended to us during this project by staff in the Water Services and Codes Administration departments. The audit team for this project included Anatoli Douditski, Edina Maltbia, and Gary White.

Mark Funkhouser
City Auditor

Follow-Up Audit: Backflow Prevention Program

Table of Contents

Follow-Up Audit: Backflow Prevention Program

List of Exhibits

Introduction

Objectives

This follow-up audit of the Water Services Department's backflow prevention program was conducted pursuant to Article II, Section 13 of the Charter of Kansas City, Missouri, which establishes the Office of the City Auditor and outlines the city auditor's primary duties.

A performance audit is an objective, systematic examination of evidence to independently assess the performance of a government organization, program, activity, or function in order to provide information to improve public accountability and facilitate decision-making. A follow-up audit is an examination to determine whether timely and appropriate corrective actions have been taken by auditee officials.[1]

This audit was designed to answer the following questions:

- What are the elements of an effective backflow prevention program?
- Are these elements currently in place in the city's backflow program?
- What elements require additional attention to improve the established prevention program?

Scope and Methodology

This follow-up audit was not designed nor intended to be another full-scale audit of the backflow prevention program. Rather, it was designed to determine the progress made by Water Services in establishing an effective backflow prevention program. The follow-up audit was performed in accordance with generally accepted government auditing standards, with the exception of the completion of an external quality control review of the office within the last three years.[2] Audit methods included:

[1] Comptroller General of the United States, *Government Auditing Standards* (Washington, DC: U.S. Government Printing Office, 1994), pp. 14 and 68.

[2] The last review was in April 1995. An external review is planned for the current year.

- Reviewing state and city legislation relevant to the backflow prevention program.

- Reviewing prior audit work and subsequent Audit Report Tracking System (ARTS) reports.

- Interviewing staff in Water Services, Codes Administration, City Communications, and representatives of professional organizations interested in backflow protection.

- Observing city inspectors performing on-site surveys for cross connections and inspections to confirm the proper installation of backflow devices.

- Reviewing records in the Water Services Department.

No information was omitted from this report because it was deemed privileged or confidential.

Background

Backflow is a condition that occurs when pressure changes within a water system cause the water flow, which normally moves from the distribution point to the consumer, to flow in the opposite direction. When this happens, contaminants may be sucked into the public water system.

In order for backflow contamination to occur, there must be a "cross-connection" or a physical link between a source of contaminants and the public water supply, and either a drop in pressure in the water pipes (resulting in back-siphonage) or an increase in pressure at the source of contaminants (back-pressure).

Examples of Backflow

In back-siphonage backflow, contaminants are siphoned through the cross connection back through the pipes into the public water system. For example, in November 1991, some homeowners complained of "blue water" flowing from their taps following a water main break in east Kansas City. Water Services inspectors found that a tank containing fertilizer was connected to the water system without a backflow prevention device. When the water main broke, a drop in pressure created a vacuum in the pipes, causing the fertilizer to be sucked into the water systems of neighboring homes.

In backpressure backflow, contaminants are literally pushed back through the cross connection and into the public water system. This sometimes occurs when certain types of soft drink dispensing machines malfunction and inject carbon dioxide into the water pipes.

Cross-connections are found in toilets, sinks, dishwashers, boilers, cooling towers, holding tanks, autoclaves, and various other water-related appliances or fixtures. Items such as sinks are usually protected by an air gap form of backflow protection, i.e. the faucet is above the flood level rim of the sink. If a hose is attached to the faucet, however, as is frequently done in mop sinks, the air gap is no longer effective. A drop in pressure in the water pipes would cause whatever is in the sink to be siphoned into the drinking water.

Common occurrences such as water main breaks, routine water line maintenance and use of fire hydrants result in reduced pressure and reversal of flow in the water line. Because cross-connections cannot always be eliminated, some form of backflow prevention should protect all water-related fixtures that could contain potential contaminants.

Legislative Authority

Federal law. Federal law holds the water utility responsible for ensuring the quality of drinking water up to the point of delivery (the water meter). While the federal government has not passed legislation specifically addressing backflow prevention, the federal Safe Drinking Water Act stipulates that the water supplier (in our case, the city) is responsible for ensuring safe drinking water. The state has primary enforcement responsibility.

State regulation. The Missouri Safe Drinking Water Act stipulates that the Department of Natural Resources (DNR) shall make and enforce rules and regulations for the maintenance of safe drinking water. The DNR has enacted regulations that allow facilities to be classified as high hazard (Class I) or low hazard (Class II), depending on the type of activity within the facility. (See Exhibit 1.) Local authorities enforce state regulations by requiring installation and annual testing of backflow prevention devices for Class I and Class II facilities.

City code. In August 1993, the City Council adopted Ordinance 930805 amending the Code of Ordinances by enacting a new article entitled "Backflow Prevention." The purpose of this article is to protect the city's water supply by preventing contaminants or pollutants from entering the public water system as a result of backflow. The code establishes the Water Services director responsible for backflow prevention efforts, authorizing the director to:

- require customers to install approved backflow prevention devices;
- require the devices to be tested upon installation and at least annually by state-certified testers; and
- terminate water service to customers who fail to comply.

Since 1992, the Code of Ordinances has also included the Uniform Plumbing Code that also requires installation of an approved backflow device. However, the purpose of the plumbing code is to provide minimum standards for the protection of public health and safety, with a primary focus on protecting building occupants.

Exhibit 1. Glossary of Terms

Containment Device - a method of backflow regulation in which a backflow prevention assembly is installed at the water service connection to a customer's premises (the water meter). Installation of a device at the water meter protects the public water supply but not the occupants of the facility.

Contaminant – any substance that could cause death, illness, or spread disease if introduced into the water supply.

Cross Connection – any actual or potential connection between the public water supply and a source of contamination or pollution.

High Hazard (Class I) - any facility that uses or produces substances that could contaminate the water supply. A Class I backflow hazard presents an actual or potential health hazard to customers of the public water system should backflow occur. Examples of high hazard facilities include hospitals, mortuaries, clinics, laboratories, plating or chemical plants, sewage treatment plants, sewage lift stations, commercial laundries, and food and beverage processing plants.

Isolation Device - a method of backflow regulation in which the backflow prevention device is installed on the customer's water service line at the point of cross connection. Installation of a device at every source of the contamination protects the building occupants as well as the public water supply.

Low Hazard (Class II) - any facility that uses or produces substances that could degrade the quality of drinking water, but is not a health hazard.

Sources: *Water & Pollution Control Department Backflow Prevention Program*, Office of the City Auditor, Kansas City, Missouri, December 1993; and Water Services and Codes Administration staff.

Program Operations

The Water Services Department's reading and services division administers the backflow prevention program. Approximately eight members of the division spend at least part of their time on backflow-related activities. Backflow prevention is not a separate program unit; consequently, revenues, expenditures, staff hours, and performance measures specifically related to backflow prevention are not readily available.

Summary of the 1993 Performance Audit

The original audit found that Water Services was not effectively enforcing the state's backflow prevention regulation. In our original audit, we identified the elements necessary for an effective backflow program. Several key elements of an effective program were missing. In addition, the original audit found that lawn irrigation systems were unregulated, some city departments were not in compliance with backflow prevention regulations, and that Water Services management may have misrepresented program efforts in testimony to the City Council.

The original report included 13 recommendations aimed at improving the effectiveness of the program and strengthening management controls. (See Appendix A.) Audit Report Tracking System (ARTS) reports submitted by management are included in Appendix B.

Findings and Recommendations

Summary

The Water Services Department has established a backflow prevention program containing many of the elements of a model program that we had developed in our original audit. A program director was hired, staff have been trained in backflow prevention, public education efforts were implemented, and records on backflow prevention efforts are maintained. Determining which existing industrial facilities should have backflow devices installed is proceeding as recommended. Virtually all city-owned facilities that needed to install backflow devices did so by October 1997.

Our follow-up work determined that some of the elements implemented since our original audit need further improvement to increase efficiency. Program staff manually review a database to determine which devices are due for annual testing; automating the process would be faster and more accurate. In addition, both Water Services and Codes Administration receive certification forms for inspections of recently installed backflow devices; coordinating the processes and forms used by the departments would reduce confusion.

Finally, we identified some program elements and activities that require significant attention by the program staff. City code still requires all new water service lines to include a backflow device even when the potential for backflow contamination is minimal or non-existent. The program still needs a written plan and timetable for implementing backflow requirements for residential accounts, particularly those with lawn sprinkler systems. The Code of Ordinances currently includes only one enforcement tool - discontinuance of water service - for non-compliance with the backflow regulations. Staff expressed reluctance to discontinue water service to city facilities and large accounts. Perhaps as a result of the lack of effective sanctions, we found that many city-owned facilities are not in compliance with annual testing requirements. Finally, we found that while city code requires re-issuance of exemptions every three years, state regulations have removed a similar requirement since our original audit was released.

A Backflow Prevention Program Has Been Developed

Our follow-up work found that the Water Services Department has established a backflow prevention program that contains almost all of the model program elements we identified as part of our 1993 audit. Most of these elements were inadequate or non-existent during the original audit.

Literature Identifies Elements of a Model Backflow Prevention Program

The original audit found inadequacies in the Water Services Department's efforts to protect the public water supply from backflow contamination. Based on literature reviews and interviews with backflow administrators in other jurisdictions, we identified nine elements of a model program. (See Appendix C for a description of each element.) The elements are:

1. Legal authority to implement and enforce the backflow program.
2. Backflow requirements based on the degree of hazard.
3. Accountability for the program.
4. Employee training efforts.
5. Methods for public education.
6. Methods to identify and prioritize among potentially hazardous facilities.
7. Inspection and follow-up to ensure each device is installed and tested.
8. Annual testing of the installed backflow device.
9. Record-keeping of backflow prevention efforts.

In comparing department efforts against the elements of a model program, the original audit determined that only one of these elements - legal authority - was in place. Implementing the original report recommendations was expected to improve protection of the city's water supply by establishing an effective backflow prevention program where one did not previously exist.

Several Model Elements Are Now in Place

Our follow-up work found that several of the model elements now exist in the city's backflow program. A program manager was hired, employees were trained, and public education efforts were implemented. Record keeping is improved. Efforts to identify existing facilities needing backflow devices are continuing. We also found that all but four city facilities were in full compliance with backflow regulations by October 1997.

One of the four sites is now protected by a backflow device. The other sites continue to need some form of backflow protection.

A program manager was hired. A program manager was hired in 1995. Once hired, he received training in backflow prevention and assumed responsibility for all administrative functions of the program.

Staff have been trained in backflow prevention. The original audit found that backflow inspectors had no formal training in determining whether a facility needed a backflow device. We recommended training for the program manager and staff.

Although state regulations do not require any specific training for employees working on the implementation of a backflow prevention program, it does mention training for backflow prevention device testers. Our follow-up efforts found that the program manager, his supervisor, the field inspections supervisor and two of the current inspectors have completed and maintained their certifications as device testers.[3]

Public education has been addressed. The original audit found the department had done little to educate the public on the dangers of backflow or ways to prevent it. We recommended a public education campaign begin as quickly as possible.

Since the original audit, public education efforts have included:

- Educational flyers mailed with customers' water bills in September and October 1995, and February 1998.
- A short video on residential backflow regularly shown on the city government channel in 1998, now used occasionally to fill small gaps in city programming.
- Speaking engagements by the program manager at area conventions and to small business and restaurant associations.
- A space on the city's website identified as the "Backflow Resource Center." This website provides users with information on backflow and how to prevent it, certification test forms, city regulations regarding backflow, and department procedures for compliance efforts.

[3] An additional inspector, recently hired, is expected to complete her training this summer. The remaining inspector position was vacant at the time of our review of training efforts.

Records on backflow prevention efforts are now maintained. The original audit found problems with records related to backflow, including inspection records and completed surveys discarded in violation of state law, and exceptions granted but not documented. We recommended that records of program efforts be maintained in accordance with state record retention requirements.

Program staff indicated they are now aware of the records retention requirements and retain all documents related to program compliance efforts. We reviewed documents retained by the program staff in their office and found evidence of older records stored off-site. While documentation of exemptions granted prior to 1997 was limited to unofficial notes and inspector log sheets, all exemptions since then are adequately documented in department records.

Efforts to prevent backflow contamination from existing facilities continues. The original audit found that efforts to achieve compliance in existing facilities did not focus initially on businesses with the highest potential for causing backflow contamination. We recommended staff consider the degree of hazard when determining which new facilities should have backflow devices.

Since the audit, program staff attempted to identify all high hazard facilities using standard industrial classification codes, then ensuring that all high hazard facilities (hospitals, mortuaries, metal plating plants, etc.) were in compliance with backflow requirements. Once these efforts were completed, staff began reviewing remaining commercial water accounts, identifying those in need of a backflow device, ensuring it was installed correctly, and overseeing annual testing. When the program manager started, there were 25,000 commercial accounts that could potentially need a backflow device. Today, approximately 9,000 accounts remain to be checked. Program staff report that more and more of these locations are found without cross-connections and thus declared exempt from needing any backflow device. Program staff report these efforts will be completed within three years.

Most city facilities needing backflow devices had them installed. During 1993 and 1994, an inspector visited all city-owned sites to identify locations with existing backflow devices and those that needed backflow protection. The director of water services wrote to department directors with facilities needing backflow devices, and asked them to comply with backflow protection requirements within six months. A memorandum from the backflow program manager to the manager of the reading and services division on October 13, 1997 reported that all but four known sites in two city departments were in compliance with the

backflow requirements. Currently, the program manager reports that the remaining device that was needed for a facility operated by the Aviation Department was installed and remains in compliance. The three remaining unprotected sites, which are all the responsibility of Parks and Recreation, still need backflow prevention devices.

Some Program Elements Need Minor Improvement

Our follow-up work identified a few program elements that need minor improvement to increase the program's efficiency. Department staff manually determine devices due for annual testing; automating the process would save time and improve accuracy. In addition, coordination needs to be improved between the Water Services and Codes Administration departments.

Identification of Devices Due for Annual Testing Should Be Automated

State regulations require that all backflow devices be tested at least annually to ensure the continued operation of the device. The Code of Ordinances contains a similar requirement, allowing up to 60 days to complete the test and submit the forms. If the test forms are not submitted after that, the water service line is considered for cut-off of service.

In an effort to increase compliance, each month the backflow program manager seeks to identify devices due for testing by manually reviewing the database to identify devices that received their last test 12 or more months previously. Program staff send letters reminding those responsible of the annual testing requirement.

The backflow database includes an automated printing program that will generate reminder letters and update the database to include the date the letter is sent and the date that the form confirming annual testing is due. However, program staff must still manually identify devices due for testing then activate the program to generate letters for each identified account.

Because the manual identification process could conceivably result in some devices needing testing not being identified, we recommend staff seek a method of automating the process of identifying devices due for annual testing to reduce the risk that a device could be overlooked and to improve operational efficiency.

Water Services and Codes Administration Staff Should Improve Coordination

Backflow devices installed as a result of Chapter 78, Article V, of the Code of Ordinances (devices installed on the water service line, outside the customer's building) are the responsibility of Water Services. Devices installed within the building in response to Chapter 18, Article V (the plumbing code) are the responsibility of Codes Administration. All devices are required to be inspected by a certified backflow assembly tester at the time of installation and both departments receive certification forms indicating the inspection was conducted. Inspection forms received by Codes are forwarded to Water Services and sometimes those forms accepted by Codes Administration are rejected by Water Services staff for not providing adequate information.

Staff in the two departments have not determined the information needed on the inspection forms to make them useable to both departments. We recommend that the directors of water services and codes administration direct their staffs to work together to coordinate their activities relating to backflow devices, including developing mutually acceptable inspection forms to be submitted in response to the installation inspection requirements.

Several Operational Areas Still Need Significant Improvement

Although program staff have improved the city's backflow program by incorporating several of the model program elements, some operational areas still need improvement. We found that the city's backflow requirements for new facilities are still not based on the relative risk of backflow contamination. As we had found in the original audit, devices are required even when the potential for contamination is minimal or non-existent. A plan is still needed for ensuring compliance with the backflow requirements for residential accounts with lawn sprinkler systems. City facilities are not obtaining annual inspections, as required by the Code of Ordinances. Program staff is reluctant to apply the one sanction – discontinuance of water service – for non-compliance with the backflow regulations. Finally, we found that while city code requires re-issuance of exemptions every three years, state regulations have removed this restriction. Addressing these areas should allow the backflow prevention program to become even more successful in its efforts to protect the city's water supply.

Requirements Based on Degree of Hazard Are Still Needed for New Facilities

Although state regulations permit backflow requirements to be hazard-based, the Code of Ordinances requires installation of a backflow device on all new commercial and industrial non-fire water service lines and new underground connections for lawn irrigation systems. The original audit determined that requiring this level of protection on all new service lines was unnecessary, and recommended amending the code to allow hazard-based requirements. Limiting required installations for new facilities to those with a potential for backflow contamination would allow staff to focus their efforts on those facilities.

State regulations are hazard-based. State regulations classify facilities according to the activities conducted in the facilities and the potential for backflow contamination. State regulations classify facilities as either Class I or Class II backflow hazards. A Class I hazard is potentially more dangerous; representing an actual or potential health hazard to customers of the public water system should backflow occur. Class II (low hazards) threaten to degrade the water quality should backflow occur. The state regulation further allows area water authorities to exempt customers from the requirements if they can demonstrate that the activities taking place at the facility, the materials used in connection with these activities or the materials stored in the premises cannot endanger the health of customers or degrade the water quality of the public water system.[4]

City code still requires installing backflow devices on all new service lines. In contrast to the state requirements, the Code of Ordinances requires installation of a device even when the potential for contamination is limited (Class II) or non-existent (no cross connections). For new facilities, the code indicates that all new water service lines must include a backflow prevention device. These stringent requirements existed at the time of our original audit, prompting us to recommend that requirements be based on the potential for contamination of the city's water supply.

Professional organizations and backflow staff in other jurisdictions recommend a hazard-based approach. During our original audit, representatives of other Missouri water utilities informed us that they base backflow prevention requirements on the degree of hazard. A representative from the American Water Works Association agreed with this approach.

[4] Missouri Code of State Regulations, 10 CSR 60-11.010.

As part of the follow-up, we again contacted representatives of the American Water Works Association and the Foundation for Cross Connection Control. The representatives stated their organizations still recommend hazard-based requirements for the installation of backflow devices.

Installation of devices for new service lines based on the degree of hazard would focus program efforts on potential hazards. Program staff acknowledge that the current database includes facilities that do not need a backflow prevention device. However, once installed, the device is subject to the same annual inspection requirements as devices that are needed to protect the city's water supply against contamination. Monitoring only those devices that are determined to be necessary focus the efforts of the program staff on those facilities that pose the greatest threat to the city's water supply.

We again recommend amending the Code of Ordinances to incorporate a hazard-based approach on the requirements for installation of a backflow device on new water service lines. Once changed, we recommend program staff develop a method of effectively determining which new facilities require backflow devices. The developed method should utilize all available city information to determine how best to protect the city's water supply. In addition, the backflow prevention program should establish a procedure whereby facilities are required to inform the city of changes in water service to ensure any changes affecting the risk of backflow can be reviewed.

A Plan Is Needed for Addressing Residential Backflow Compliance

The original audit recommended that program staff begin to address backflow prevention efforts on existing lawn irrigation systems. The report noted that most irrigation systems connect to the city's water supply through the customer's internal plumbing. Such connections would be regulated by the plumbing code, which only requires installation of backflow prevention devices for new irrigation systems.

The Code of Ordinances was amended on January 22, 1998 with a requirement that new and existing irrigation systems with or without facilities for injection of pesticides, herbicides or other chemicals must have an approved backflow prevention device installed in accordance with city requirements.

No focus on residential accounts. The backflow prevention unit has been focusing its efforts on new and existing industrial water service lines. The program manager reported that he does not plan to start

enforcement of backflow protection for residential accounts until he achieves full compliance for commercial accounts and city-owned facilities.

Although achieving compliance with backflow requirements for lawn irrigation systems has been given some thought, a written plan is still needed. Developing a plan prior to actual implementation would provide an opportunity for input from program and other departmental staff, as well as the mayor, City Council, and city manager on ways to achieve compliance effectively while protecting the city's water supply.

The developed plan should describe how the program will ensure compliance with the backflow requirements and should include a timetable for implementation of the residential efforts. It should be approved by the water services director and presented to the mayor, City Council, and city manager.

Enforcement Mechanisms Should Include Graduated Sanctions

Under the Code of Ordinances, the only sanction that can be applied when required backflow prevention devices are not installed or maintained is discontinuance of water service. Reluctance by program staff to impose this sanction decreases its use as an effective enforcement tool. Our follow-up identified at least 33 backflow devices installed in city-owned facilities that are not in compliance with the annual testing requirement. It is possible that the staff's reluctance to impose water shut-off sanctions have contributed to this lack of compliance.

Code is limited. City code provides the program with a single source of enforcement power. The Code of Ordinances states that:

> Water service to any premises shall be discontinued by the department if a backflow prevention assembly required by this article is not installed, tested and maintained, or if it is found that a backflow prevention assembly has been removed or bypassed, or if an unprotected cross connection exists on the premises. Service will not be restored until such conditions or defects are corrected.[5]

The requirement to discontinue service to customers that have not complied with backflow prevention requirements is included in the state regulations. The state requires the water supplier to sever the public water system from the customer service line when the supplier has

[5] Code of Ordinances, Kansas City, Missouri, Section 78-294.

knowledge that the location has an unprotected cross connection or knowledge that the customer refuses to correct known deficiencies in compliance with the backflow requirements.

Program staff are reluctant to discontinue water service. The program manager reports that he feels he cannot shut off water service when city departments and big commercial accounts are not in compliance with backflow prevention. And because water service is not discontinued for large accounts and city-owned facilities, he indicated that he is uncomfortable shutting off water service for smaller commercial or even residential accounts.

Not all city facilities are complying with annual testing requirements. Our follow-up determined that although virtually all city-owned facilities were in compliance with the code requirements as of October 1997, not all of those facilities are now in compliance with annual testing requirements.

We obtained a copy of the program's turn-off list as of April 30, 1999 and noted instances where city departments had not obtained annual testing. The results are shown in Exhibit 2.

Exhibit 2. Departments with Backflow Devices Lacking Annual Tests

City Department	Number of Devices
Parks and Recreation	25
Public Works	4
Water Services	4
Total	33

Source: Backflow program records.

As indicated, at least 33 backflow devices installed at city-owned facilities have not received annual tests. The program manager reports his efforts to obtain compliance with annual testing requirements is especially difficult at city-owned facilities because staff do not fear their water being turned off.

Other enforcement options are needed. Because of their reluctance to discontinue water service to achieve backflow compliance, we recommend backflow prevention staff work with the Law Department to seek an interim step, such as the imposition of a daily fine or other penalty. Whatever method is developed should provide an incentive for water service customers to comply with the backflow requirements without disrupting operations as significantly as discontinuing water service. However, the developed method should not eliminate using enforcement tactics such as discontinuing water service when previous efforts to achieve compliance have failed.

The Code Should Be Amended to Eliminate Limits on Exemption Awards

The Code of Ordinances allows the director of water services to exempt customers with existing water service lines from the backflow prevention requirements. The code requires re-issuance of exemptions every three years. The three-year requirement has been removed from the state regulations since our original audit. Instead, state regulations require customers to notify their water utility of any changes in water service. This requirement, combined with efforts by backflow program staff to ensure they are routinely notified of changes in water service, should be sufficient to protect the city's water supply. We suggest amending the Code of Ordinances to reflect the current state regulations.

Hundreds of exemptions have expired. As indicated in Exhibit 3 approximately 3,700 exemptions are included in the backflow database. Almost 900 of these were granted between 1993 and 1996. Based on the current Code of Ordinances, all of these exemptions have expired. Although aware of their expiration, the backflow program manager reports the exemptions have not been re-issued, because staff time is focused on new construction and existing industrial accounts.

Exhibit 3. Backflow Prevention Exemptions and Installations

Year	Exemptions Granted	Backflow Devices Installed	Totals
1993	8	1,281	1,289
1994	137	668	805
1995	83	835	918
1996	643	699	1,342
1997	1,194	851	2,045
1998	1,047	622	1,669
1999	574	231	805
Totals	3,686	5,187	8,873

Source: Water Services Department Backflow Database.

Regulations place responsibility to communicate changes on customers. Both state regulations and city code require water customers that receive exemptions from the backflow program requirements to keep the water supplier informed of any changes in service that might affect the exemption. The state regulations indicate that any exemptions granted shall be void if the supplier of water:

> Determines that the customer facility has become an actual or potential backflow hazard, or if the customer fails to provide notice at least fourteen (14) days prior to making any change

> in process, plumbing, or materials used or stored at the facility.[6]

The Code of Ordinances includes a similar requirement that notification is due at least 14 days prior to the change.

The requirement that water customers awarded exemptions notify Water Services staff of changes that might affect the continued applicability of the exemption could eliminate the need to reissue exemptions every three years. Backflow program staff might additionally ensure they are routinely notified of changes in water service using information within the department on changes in water service line ownership or water usage. This would provide a proactive method of ensuring they are aware of any changes that might affect the exemption, even when customers do not notify them. Once procedures to routinely identify changes in water service are in place, we recommend the Code of Ordinances be amended to reflect the current state regulations.

[6] Missouri Code of State Regulations, 10CSR 60-11.010.

Recommendations

1. The city manager should submit for City Council approval an ordinance requiring installation of approved backflow device based on the degree of hazard for new facilities. As part of the change, the director of water services should establish a method of effectively determining which new water service lines require backflow devices.

2. The city manager should include in his proposed ordinance an amendment removing the three-year exemption re-issuance requirement. As part of the change, the director of water services should establish a system providing for customer notification of changes in water usage, identifying non-reported changes in water service through contacts with other city staff, and for determining if previously awarded exemptions remain applicable.

3. The director of water services should develop a written plan for the identification of hazards and enforcement of backflow protection on new and existing residential accounts, particularly lawn sprinkler systems. The plan should include a timetable for implementation. The plan should be presented to the mayor, City Council, and city manager.

4. The director of water services should work with the Law Department to develop intermediate enforcement sanctions for non-compliance with backflow requirements.

5. The city manager should ensure all city-owned facilities comply with the annual backflow testing requirements.

6. The director of water services should automate identification of backflow devices due for annual testing.

7. The directors of water services and codes administration should direct staff to cooperate on backflow prevention services, including the development of a mutually useable form for backflow device installation inspections.

Appendix A

Prior Audit Recommendations

Prior Audit Recommendations

1. The Director of the Water and Pollution Control Department should develop written procedures and policies to implement Ordinance 930805 as it relates to new facilities, including establishing a program of routine inspections and follow-up, monitoring of test results, spot-check tests of devices to ensure that state-certified testers are adequately performing their duties, and prompt impositions of sanctions outlined in the ordinance.

2. The Director of the Water and Pollution Control Department should appoint a full time program manager. This person should be trained in the causes and hazards of backflow and should have the authority to enforce the backflow prevention regulation.

3. The Director of the Water and Pollution Control Department should maintain all inspection records in accordance with state law and City regulations.

4. The City Manager should submit for City Council approval an amendment to Ordinance 930805 which provides for backflow protection on new commercial water services that is commensurate with the degree of hazard.

5. The Director of the Water and Pollution Control Department should fully implement Ordinance 930805 as it relates to existing facilities by establishing management controls including formal written policies and procedures, routine inspections of backflow prevention devices following installation, follow-up, monitoring of test results, spot-check tests of devices to ensure that state-certified testers are adequately performing their duties, and prompt impositions of sanctions outlined in the ordinance.

6. The Director of the Water and Pollution Control Department should determine the number of staff and additional training necessary to fully implement the program and ensure that staff are assigned and trained as necessary.

7. The Director of the Water and Pollution Control Department should develop a public education campaign as quickly as possible. At a minimum, educational pamphlets should be prepared and sent to commercial and residential customers with their water bills.

8. The Director of the Water and Pollution Control Department should revise the notification letter that is sent to commercial customers. The letter should clearly state what types of facilities are required to comply with the backflow prevention regulation and should provide more information about the causes and hazards of backflow. The letter should state that inspectors will perform a survey of the facility to determine whether a backflow prevention device is needed, if the customer has any doubt that their property is a potential backflow hazard.

9. The Director of the Water and Pollution Control Department should review City and state records retention requirements and ensure that the department is adequately documenting program activities and retaining any documents that record City transactions. Backflow prevention surveys should be individually documented and filed with test reports and inspection slips. The documents should be cross-referenced to the permit. Water customers should be given a copy of the survey report.

10. The City Manager should submit for Council approval an amendment to Ordinance 930805 to require an approved backflow prevention device on all new and existing in-ground lawn irrigation systems. If necessary, the city's plumbing code should be amended to clarify that a water service permit is required to install a lawn irrigation system.

11. The Director of the Water and Pollution Control Department should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

12. The Director of the Water and Pollution Control Department should work with the City Manager to identify all City-owned hazards and develop a plan to quickly bring the City into compliance with the state backflow prevention regulation and the City's own ordinance.

13. The City Manager should ensure that information provided to the City Council accurately reflects program activities and results.

Appendix B

Audit Report Tracking System (ARTS) Reports

Audit Report Tracking System

1. Audit Title	2. This Report Date
Backflow Prevention Program	6/24/94
3. Department	**4. Last Report Date**
Water & Pollution Control Department	
5. Department Head	**6. Contact Person/Phone**
Gurnie Gunter	Bonnie McKelvy
7. Audit Release Date	**8. ARTS Number**
December, 1993	

9. Status of All Audit Recommendations

	Status	Date		Status	Date
1.	Implemented	5/94	7.	In Process	6/94
2.	In Process	6/94	8.	Implemented	5/94
3.	Implemented	5/94	9.	In Process	6/94
4.	In Process	5/94	10.	In Process	6/94
5.	Implemented	5/94	11.	In Process	6/94
6.	In Process	5/94	12.	In Process	4/94
			13.	Implemented	12/93

10. Recommendations Included in this Report

Recommendation No. 1: Develop written procedures and policies to implement Ordinance 930805 as it relates to new facilities, including establishing a program of routine inspections and follow-up, monitoring of test results, spot-check tests of devices to ensure that state-certified testers are adequately performing their duties, and prompt impositions of sanctions outlined in the ordinance.

Status: Implemented. The procedures manual is in place, with a few areas still needing expansion.

Recommendation No. 2: Appoint a full time program manager. This person should be trained in the causes and hazards of backflow and should have the authority to enforce the backflow prevention regulation.

Status: In Process. Funding for the positions were not in place until the FY95 budget was approved. However, positions have been requisitioned.

Recommendation No. 3: Maintain all inspection records in accordance with state law and City regulations.

Status: Implemented. We are maintaining records in accordance with regulations.

Recommendation No. 4: The City Manager should submit for City Council approval an amendment to Ordinance 930805 which provides for backflow protection on new commercial water services that is commensurate with the degree of hazard.

Status: In Process. The Department is re-examining the requirement of backflow protection on all new commecial water services.

Audit Report Tracking System

Audit Title:
Report Date:

10. Recommendations Included in this Report (continued)

Recommendation No. 5: Fully implement Ordinance 930805 as it related to existing facilities by establishing management controls including formal written policies and procedures, routine inspections of backflow prevention devices following installation, follow-up, monitoring of test results, spot-check tests of devices to ensure that state-certified testers are adequately performing their duties, and prompt impositions of sanctions outlined in the ordinance.

Status: Implemented. This has been implemented with the exception of spock-check tests of devices by the state certified testers.

Recommendation No. 6: Determine the number of staff and additional training necessary to fully implement the program and ensure that staff are assigned and trained as necessary.

Status: In Process. Staffing needs were identified during the budget process, and training is planned throughout the year.

Recommendation No. 7: Develop a public education campaign as quickly as possible. At a minimum, educational pamphlets should be prepared and sent to commercial and residential customers with their water bills.

Status: In Process. The task of development of the pamplets was assigned to the Codes Administration Department by the Operations and Aviation Committee Chairperson. Once the pamplet is developed, the Water Department will include as an insert with bills sent to customers.

Recommendation No. 8: Revise the notification letter that is sent to commercial customers. The letter should clearly state what types of facilities are required to comply with the backflow prevention regulation and should provide more information about the causes and hazards of backflow. The letter should state that inspectors will perform a survey of the facility to determine whether a backflow prevention device is needed, if the customer has any doubt that their property is a potential backflow hazard.

Status: Implemented. This was completed in May, 1994.

Recommendation No. 9: Review City and state records retention requirements and ensure that the department is adequately documenting program activities and retaining any documents that record City transactions. Backflow prevention surveys should be individually documented and filed with test reports and inspection slips. These documents should be cross-referenced to the permit. Water customers should be given a copy of the survey report.

Status: In Process. We currently retain all program activities on a computer. We are in the process of developing a survey form.

Recommendation No. 10: The City Manager should submit for Council approval an amendment to Ordinance 930805 to require an approved backflow prevention device on all new and existing in-ground lawn irrigation systems. If necessary, the City's plumbing code should be amended to clarify that a water service permit is required to install a lawn irrigation system.

Audit Report Tracking System

Audit Title:
Report Date:

10. Recommendations Included in this Report (continued)

Status: The Codes Administration Department in cooperation with a users task force is reviewing the requirement of an approved backflow prevention device on all in-ground lawn irrigation systems and will make a recommendation to the City Manager.

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: This recommendation was assigned to the Codes Administration Department by the Operations and Aviation Committee chairperson.

Recommendation No. 12: The Director of Water and Pollution Control should work with the City Manager to identify all City-owned hazards and develop a plan to quickly bring the City into compliance with the state backflow prevention regulation and the City's own ordinance.

Status: In Process. We are in the process of identifying and inspecting all City-owned buildings to determine compliance needs.

Recommendation No. 13: The City Manager should ensure that information provided to the City Council accurately reflects program activities and results.

Status: Implemented. The Water and Pollution Control Department will make every effort to provide information that reflects program activities and results.

Audit Report Tracking System

1. Audit Title Backflow Prevention Program	2. This Report Date 6/27/95
3. Department Water Services Department	4. Last Report Date 6/24/94
5. Department Head Gurnie Gunter	6. Contact Person/Phone Mable Ramey-Moore Ext. 2976
7. Audit Release Date December, 1993	8. ARTS Number

9. Status of All Audit Recommendations

	Status	Date		Status	Date
1.	Implemented	5/94	7.	In Process	6/95
2.	Implemented	1/95	8.	Implemented	5/94
3.	Implemented	5/94	9.	Implemented	9/94
4.	In Process	6/95	10.	In Process	6/95
5.	Implemented	5/94	11.	In Process	6/95
6.	Implemented	4/95	12.	Implemented	9/94
			13.	Implemented	12/93

10. Recommendations Included in this Report

Recommendation No. 2: Appoint a full time program manager. This person should be trained in the causes and hazards of backflow and should have the authority to enforce the backflow prevention regulation.

Status: Implemented. Arnold W. Nelson was hired effective 01/09/95. He has taken the State approved 40 hour course and has been certified as a State Approved Backflow Tester. He has full administrative responsibility for the Department's backflow prevention program.

Recommendation No. 4: The City Manager should submit for City Council approval an amendment to Ordinance 930805 which provides for backflow protection on new commercial water services that is commensurate with the degree of hazard.

Status: In Process. The Department is reviewing the present practice of considering all new commercial services as potential Class I hazards and requiring the installation of an RPZ type backflow prevention assembly. Several issues remain to be resolved. Our Department will be meeting with Codes Administration to determine the options for discovering if the potential hazard of the uses of a particular building or facility changes after the initial hazard rating.

Recommendation No. 6: Determine the number of staff and additional training necessary to fully implement the program and ensure that staff are assigned and trained as necessary.

Status: Implemented. Staffing needs were identified and additional positions were added to the budget in Fiscal Year 1994-95. All positions have now been filled. All four of the new Water Service Inspectors have received both certified tester training and survey training. Additional training will be ongoing.

Recommendation No. 7: Develop a public education campaign as quickly as possible. At a minimum, educational pamphlets should be prepared and sent to commercial and residential customers with their water bills.

Audit Report Tracking System

Audit Title: Backflow Prevention Program
Report Date: 06/27/95

10. Recommendations Included in this Report (continued)

Status: In Process. The first informational pamphlet has been developed. A copy is attached. A date for the mailing has been scheduled for September 1, 1995.

Recommendation No. 9: Review City and state records retention requirements and ensure that the department is adequately documenting program activities and retaining any documents that record City transactions. Backflow prevention surveys should be individually documented and filed with test reports and inspection slips. These documents should be cross-referenced to the permit. Water customers should be given a copy of the survey report.

Status: Implemented. We currently retain records of all program activities in computer databases. Test forms and survey forms are filed, cross referenced by reg. number.

Recommendation No. 10: The City Manager should submit for Council approval an amendment to Ordinance 930805 to require an approved backflow prevention device on all new and existing in-ground lawn irrigation systems. If necessary, the City's plumbing code should be amended to clarify that a water service permit is required to install a lawn irrigation system.

Status: In process. Ordinance #940905 was enacted in September 1994. It amends the City's plumbing code to make the requirements for backflow prevention on in-ground lawn irrigation systems consistent with the State backflow regulation. A second ordinance #950163 was enacted on February 23, 1995 to require the submission of the results of testing of backflow prevention assemblies to the Director of Codes Administration or the Director of Water Services and to clarify the referrals between the two departments. The need for a third ordinance specifically addressing existing lawn irrigation is currently under review.

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: In Process. Existing lawn irrigation systems have been identified by our meter readers and accounts in the Water Master Files have been flagged so that reports can be generated. There are plans to conduct an informational mailing to all water customers explaining potential backflow hazards and requesting voluntary installation of backflow prevention devices on all existing lawn irrigation systems. Lawn irrigation systems are covered in the informational pamphlet described in the status report on recommendation No. 7.

Recommendation No. 12: The Director of Water and Pollution Control should work with the City Manager to identify all City-owned hazards and develop a plan to quickly bring the City into compliance with the state backflow prevention regulation and the City's own ordinance.

Status: Implemented. A survey was conducted to identify all City owned facilities and recommend level of backflow protection required. Lists of such facilities (broken down by Department) were sent to the City Manager's office in September 1994. The lists included estimates of cost for each installation. The Director of the Water Services Department will be sending out reminder letters to the Directors of each department affected encouraging them to follow through on the commitments they make to have the devices installed by the end of the present fiscal year.

Audit Report Tracking System

1. Audit Title	2. This Report Date
Backflow Prevention Program	01/22/96
3. Department	**4. Last Report Date**
Water Services Department	06/27/95
5. Department Head	**6. Contact Person/Phone**
Gurnie Gunter	Mable Ramey-Moore Ext. ~~2976~~ 2945
7. Audit Release Date	**8. ARTS Number**
December, 1993	

9. Status of All Audit Recommendations

	Status	Date		Status	Date
1.	Implemented	5/94	7.	Implemented	9/95
2.	Implemented	1/95	8.	Implemented	5/94
3.	Implemented	5/94	9.	Implemented	9/94
4.	Implemented	1/96	10.	In Process	1/96
5.	Implemented	5/94	11.	In Process	1/96
6.	Implemented	4/95	12.	Implemented	9/94
			13.	Implemented	12/93

10. Recommendations Included in this Report

Recommendation No. 4: The City Manager should submit for City Council approval an amendment to Ordinance #930805 which provides for backflow protection on new commercial water services that is commensurate with the degree of hazard.

Status: Implemented The Law Department has rendered an opinion that "...the current backflow prevention requirements adopted by the City Council, and codified in the stated sections of the Code of Ordinances, meet the requirements established by the Missouri Department of Natural Resources, and provide for backflow protection on new commercial water services that is commensurate with the degree of hazard." A copy of the memo is attached.

Recommendation No. 7: Develop a public education campaign as quickly as possible. At a minimum, educational pamphlets should be prepared and sent to commercial and residential customers with their water bills.

Status: Implemented During the months of September and October, 1995 information pamphlets pertaining to backflow were sent with the water bills to all consumers. This pamphlet, "Backflow Facts: Hints to Avoid a Problem," explained the facts pertaining to backflow problems and helpful hints to avoid them. A copy of the pamphlet is attached.

Recommendation No. 10: The City Manager should submit for Council approval an amendment to Ordinance #930805 to require an approved backflow prevention device on all new and existing in-ground lawn irrigation systems. If necessary, the City's plumbing code should be amended to clarify that a water service permit is required to install a lawn irrigation system.

Status: In-Process The ordinance has been amended to require a water service permit for installation of backflow devices on lawn irrigation systems. A draft amendment to change the ordinance to require backflow protection on existing lawn irrigation systems has been prepared by the Law Department. Please refer to he attached memo.

Audit Report Tracking System

Audit Title:
Report Date:

10. Recommendations Included in this Report (continued)

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: In-Process Existing lawn irrigation systems have been identified by our meter readers and accounts in the water Master File have been flagged so that reports can be easily generated. An informational mailing to all water customers has been completed. The mailing included information on the need for backflow protection for lawn irrigation systems. The issue of requiring retrofit of existing residential lawn irrigation systems has become politically controversial since the last ARTS report. The Kansas state legislature has declined to give local jurisdictions the authority to require them. The Nebraska state legislature has repealed the requirements in that state. If our City Council decides that requiring retrofit of existing residential lawn irrigation systems is in the best interest of our City, then the Water Services Department is prepared to incur compliance.

Audit Report Tracking System

1. Audit Title	2. This Report Date
Backflow Prevention Program	11/08/96
3. Department	**4. Last Report Date**
Water Services Department	01/22/96
5. Department Head	**6. Contact Person/Phone**
Gurnie Gunter	Robbi Jackson Ext. 2941
7. Audit Release Date	**8. ARTS Number**
December, 1993	

9. Status of All Audit Recommendations

Status		Date	Status	Date
10.	Implemented	11/94		
11.	In Process	11/96		

10. Recommendations Included in this Report

Recommendation No. 10: The City Manager should submit for Council approval an amendment to Ordinance #930805 to require an approved backflow prevention device on all new and existing in-ground lawn irrigation systems. If necessary, the City's plumbing code should be amended to clarify that a water service permit is required to install a lawn irrigation system.

Status: Implemented The enactment of Ordinance No. 940905 provides the recommended amendment to the City's plumbing code.

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: In-Process Existing lawn irrigation systems have been identified by our meter readers and accounts in the water Master File have been flagged so that reports can be easily generated. An informational mailing to all water customers has been completed. This mailing included information on the need for backflow protection for lawn irrigation systems. The issue of requiring retrofit of existing residential lawn irrigation systems has become politically controversial. The Kansas state legislature has declined to give local jurisdictions the authority to require them. The Nebraska state legislature has repealed the requirements in that state. In addition, the Missouri Department of Natural Resources is currently considering a revision to existing regulations that would extend the compliance date on Class I hazards to 8/30/99 and to 8/30/2000 on Class II hazards.

Audit Report Tracking System

Audit Title:
Report Date:

10. Recommendations Included in this Report (continued)

Recommend that we be allowed to defer implementation until MDNR has an opportunity to fully review the issue.

Audit Report Tracking System

1. Audit Title Backflow Prevention Program	2. This Report Date 06/06/97
3. Department Water Services Department	4. Last Report Date 11/08/96
5. Department Head Gurnie Gunter	6. Contact Person/Phone Jean-Pol Mahieu Ext. 5174
7. Audit Release Date December, 1993	8. ARTS Number

9. Status of All Audit Recommendations

	Status	Date	Status	Date
11.	In Process	6/97		

10. Recommendations Included in this Report

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: In-Process Existing lawn irrigation systems have been identified by our meter readers and accounts in the water Master File have been flagged so that reports can be easily generated. An informational mailing to all water customers has been completed. The mailing included information on the need for backflow protection for lawn irrigation systems.

The Joint Committee on Administrative Rules (JCAR) is currently reviewing proposed revisions to the regulations. It has until June 30, 1997 to repeal, review or amend the proposed DNR Rules. It appears at this point that the modified rules will not be effective until December 29, 1997.

We recommend that we continue deferring implementation until these new rules are effective.

Audit Report Tracking System

1. Audit Title	2. This Report Date
Backflow Prevention Program	12/10/97
3. Department	**4. Last Report Date**
Water Services Department	6/6/97
5. Department Head	**6. Contact Person/Phone**
Gurnie Gunter	Jean-Pol Mahieu Ext. 5174
7. Audit Release Date	**8. ARTS Number**
December, 1993	

9. Status of All Audit Recommendations

	Status	Date	Status	Date
11.	In Process	Dec-97		

RECEIVED
DEC 16 1997
CITY AUDITOR'S OFFICE

10. Recommendations Included in this Report

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: In-Process Existing lawn irrigation systems have been identified by our meter readers and accounts in the water Master File have been flagged so that reports can be easily generated. An informational mailing to all water customers has been completed. The mailing included information on the need for backflow protection for lawn irrigation systems.

The state regulation on the Prevention of Backflow (10 CSR 60-11.010) has been revised and authorized on September 30, 1997, with an effective date of December 29, 1997. After much debate during the revision process, the requirement regarding the hazards of lawn irrigation systems remained unchanged. Therefore, based on the DNR regulation, the Water Services Department is recommending that our consumers be notified and required to install the appropriate backflow device on their lawn irrigation systems.

The code of ordinances covers new water connections; however, Water Services Department is preparing an ordinance to be introduced and approved covering existing lawn irrigation systems because no such code currently exists.

Audit Report Tracking System

RECEIVED
JUN 15 1998
CITY AUDITOR'S OFFICE

1. Audit Title: Backflow Prevention Program	2. This Report Date: 06/01/98
3. Department: Water Services Department	4. Last Report Date: 12/10/97
5. Department Head: Gurnie Gunter	6. Contact Person/Phone: Jean-Pol Mahieu Ext. 5174
7. Audit Release Date: December, 1993	8. ARTS Number:

9. Status of All Audit Recommendations

	Status	Date	Status	Date
11	Complete	Jan, 1998		

10. Recommendations Included in this Report

Recommendation No. 11: The Director of Water and Pollution Control should develop methods to identify existing lawn irrigation systems and ensure that backflow prevention devices are installed and maintained on such systems.

Status: Complete Ordinance #980004, passed January 22, 1998, resolved the last outstanding issue, the installation of a backflow prevention device on existing lawn inigation systems.

Per a prior agreement with the City Council, the development community, DNR and plumbers associations, we are continuing our notification and inspection of Class I and commercial facilities, and will not begin actual actual enforcement of Class II consumers including residential lawn irrigation systems until approximately December, 1999. We have continued our eductional efforts: we did a news release regarding the new ordinance, we had a booth at the Foower Lawn and Garden Show, and the Home Show, we did another Water Bill insert, and we are currently working on a backflow video, due to be completed by August, 1998.

Appendix C

Elements of a Model Backflow Prevention Program

Elements of a Model Backflow Prevention Program

Description	City's Backflow Program	
	1993	1999
Legal authority to implement and enforce program – Requires the local authority to pass an ordinance that outlines the process of implementation and enforcement, the first step in establishing a legally enforceable program.	**Yes**	**Yes**
Requirements based on degree of hazard – The established regulations should be based on the health risks of the substances that could backflow. A high hazard facility containing cross-connections involving substances that could cause death or illness would require a backflow device offering the highest level of protection. A facility with cross connections involving aesthetically objectionable substances, but not a health hazard, might only need a containment device.	**Needs work**	New/Existing **No/Yes**
Accountability – At least one person is responsible for carrying out the program. This person must also have the authority to enforce the regulation.	**No**	**Yes**
Employee training – All employees in the program must be knowledgeable about the causes and hazards of unprotected cross connections. Personnel who administer the program might be trained in backflow survey techniques, device repair, or be certified as backflow prevention device testers.	**Needs work**	**Yes**
Public education – Water customers share the responsibility for preventing backflow contamination. Customers should be aware of the potential for backflow contamination to protect their own and the public water supply.	**No**	**Yes**
Methods to identify and prioritize among potentially hazardous facilities – Procedures should first identify and protect against the most potentially hazardous facilities. Hazards are identified by reviewing plans or through the permitting process. The requirements are then extended to existing facilities where the degree of hazard is typically determined by surveying the premises.	**Needs work**	New/Existing **No/Yes**
Inspection and follow-up to ensure that the device is installed and tested – Program staff notify water customers and/or contractors what device is required based on the degree of hazard. Inspections are conducted by the staff or certified testers to ensure proper installation.	**Needs work**	**Yes**
Annual testing – Following installation, backflow prevention devices should be tested at least annually to ensure that the device continues to protect the public water supply.	**Needs Work**	**Yes**
Record keeping – Adequate records of all transactions should be maintained. The record system should track the installation date of backflow devices, their location, inspection and testing efforts, the performance of backflow prevention devices, and the performance of licensed testers.	**Needs Work**	**Yes**

Sources: *Water & Pollution Control Department Backflow Prevention Program*, Office of the City Auditor, Kansas City, Missouri, December 1993; and City Auditor's Office evaluations.

Appendix D

City Manager’s Response

Office of the City Manager

DATE: August 9, 1999

TO: Mark Funkhouser - City Auditor's Office

FROM: Robert L. Collins, City Manager

SUBJECT: Draft of Backflow Prevention Follow-up Audit Report

The City Manager's Office has reviewed the Backflow Prevention Follow-up Audit Report and would offer the following response to recommendations 1,2 and 5.

Recommendation 1: The City Manager's Office will work with Water Services to submit an ordinance when Water Services Department can support a hazard based program. The Director of Water Services Department is in agreement to establish a hazard based program to be implemented within six months.

Recommendation 2: The City Manager's Office agrees and will work with Water Services Department and Law Department to develop an ordinance which removes the three-year exemption requirement. The Water Services Department has agreed to develop a method through its CIS and other City databases and Departments to develop a system to determine and maintain status or change of customer usage.

Recommendation 5: The City Manager's Office agrees and will take necessary measures to assure all City-Owned facilities are in compliance.

Robert L. Collins

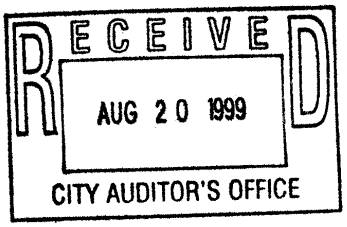
RLC:emm
cc: Gurnie Gunter, Water Services Department

I:\EM\CityMgr\TR\CMO 0336

Appendix E

Director of Water Services' Response

Water Services Department



DATE: August 18, 1999

TO: Mark Funkhouser - City Auditor's Office

FROM: Director

SUBJECT: WSD Response to Draft of Backflow Prevention Follow-up Audit Report

The Water Services Department has reviewed the Draft of the Backflow Prevention Follow-up Audit Report and would offer the following response to recommendations 2, 3, 4, 6 and 7.

Recommendation 2: Water Services Department agrees and will develop such a system.

Recommendation 3: Water Services Department has been addressing hazards of backflow with new residential accounts and attempting to identify existing accounts with lawn sprinkler systems abeit on a low priority. The Department agrees that a formal written plan should be developed and will endeavor to have one ready for submittal to Mayor, Council and City Manager within six months.

Recommendation 4: Water Services Department agrees and will work with the Law Department to develop intermediate enforcement actions for non-compliance with backflow regulations, e.g the annual device testing requirement.

Recommendation 6: The generation of data on devices requiring annual testing is currently automated. Cross-checking to validate correct customer for the account is currently done manually. Water Services Department agrees that an interface program should be written to automate this function.

Recommendation 7: Water Services Department agrees and we will instigate a dialogue with Codes Administration to arrive at a common form. It should be noted that Water Services Department is using a state approved form. (attached)

Mark Funkhouser
Page 2
August 18, 1999

Attached are comments from Water Services Department Attorney concerning Recommendation 4.

Gurnie C. Gunter

GCG:ceb

Dennis Lee - 274-1596
08/19/99 10:49 AM

To: Frank Pogge/ws/kcmo@kcmo
cc:
Subject: Draft of Backflow Prevention Follow-up Audit Report

The major item addressed to the Law Department, from pages 15 and 16, is whether the Code of Ordinances can be amended to provide "graduated" sanctions for noncompliance. Currently, the Code allows only one sanction: discontinuance of water service. Mr. Funkhouser suggests imposition of "a daily fine or other penalty".

In the first instance, 10 C.S.R. 60-11.010(8)(A) imposes a stated duty upon the supplier of water to sever the public water system from the customer service line when the supplier has knowledge that the customer is maintaining an unprotected cross-connection. The State regulations don't provide or suggest any lesser enforcement mechanism.

Secondly, Mo. Const. Article I, Section 31 states "That no law shall delegate to any commission, bureau, board or other administrative agency authority to make any rule fixing a fine or imprisonment as punishment for its violation". I have taken this provision to mean that the authority to impose fines or imprisonment is limited to the judicial branch, as opposed to the executive branch, of government within the state of Missouri. When I represented liquor control, there were, from time to time, requests to allow administrative fines in lieu of license suspensions or revocations for violations, and the advice that I gave at the time was that such form of punishment was prohibited by the stated Constitutional provisions.

With that premise, I suggest it is possible to amend the building code or waterworks ordinance in such manner that failure to install and/or maintain backflow prevention devices could be an ordinance violation prosecutable in municipal court, with fines which could be assessed on a daily basis. I don't want to be construed as recommending that methodology, but that's my perception of a procedure which might be implemented to encourage enforcement without actually terminating water service, and which would not violate the referenced Constitutional section.

I believe that the remaining sections of the audit report are addressed primarily to the Water Services Department administrative staff, and the Law Department will assist in addressing legal issues in implementing staff response.

CITY OF FOUNTAINS
HEART OF THE NATION
KANSAS CITY
MISSOURI

Codes Administration

Inspections

405 East 13th Street
3rd Floor
Kansas City, Missouri 64106

Inspections: (816) 545-3000
Investigations: (816) 545-3020
Fax: (816) 545-5094

BACKFLOW PREVENTION ASSEMBLY TEST DATA

This report must be filled out and returned to Codes Administration upon completion of the testing of the backflow prevention device.

Name of premises (company, person, etc.) _____

Address _____ Permit No. _____

Location of Device _____

Type of Device _____ Manufacturer _____

Serial NO. _____ Model No. _____ Size _____

Prevents Backflow from:
Lawn Irrigation _____
Boiler _____
Fire Protection _____
Other _____

I hereby certify that the backflow prevention assembly complies with this code and all other applicable statutes, ordinances, regulations or other law.

Date Assembly was tested and Passed _____ Time _____

Tested by _____
Print Name Certification No.

Signature _____ Phone No. _____

BACKFLOW PREVENTER
TEST & MAINTENANCE FIELD DATA

RETURN TO: WATER SERVICES DEPT - BACKFLOW UNIT,
5TH FLOOR, 414 E 12TH ST, KANSAS CITY MO 64106

NOTE: A COPY OF THIS FORM MUST BE MADE AND GIVEN TO THE CUSTOMER, TESTER MUST KEEP A COPY, AND ORIGINAL MUST BE SENT TO THE WATER DEPARTMENT. TYPE OR PRINT CLEARLY.

Register Number 147777 Assembly Serial Number 184950 Size 4.0

Service Address 3800 E 51ST ST Manufacturer WATTS

Valve number _____ (if multiple valves) Model 909

PUT AN "X" IN THE APPROPRIATE BLANKS

INITIAL TEST	Passed/Failed	FINAL TEST AFTER REPAIR	Passed/Failed
REDUCED PRESSURE ASSEMBLY:	_____/_____	REDUCED PRESSURE ASSEMBLY:	_____/_____
1ST CHECK held in direction of flow ____PSID (5 or more)	_____/_____	1ST CHECK held in direction of flow ____PSID (5 or more)	_____/_____
RELIEF VALVE opened at ____PSID (2 or more)	_____/_____	RELIEF VALVE opened at ____PSID (2 or more)	_____/_____
DIFFERENCE (1st check-relief) ____PSID (3 or more)	_____/_____	DIFFERENCE (1st check-relief) ____PSID (3 or more)	_____/_____
2ND CHECK held in direction of flow ____PSID (1 or more)	_____/_____	2ND CHECK held in direction of flow ____PSID (1 or more)	_____/_____
2ND CHECK held backpressure	_____/_____	2ND CHECK held backpressure	_____/_____
NO. 2 SHUTOFF VALVE leak tight	_____/_____	NO. 2 SHUTOFF VALVE leak tight	_____/_____
RELIEF VALVE exercised in full open position	_____/_____		
NOTE: FAILURE OF ANY OF THE ABOVE ITEMS REQUIRES REPAIR			

INITIAL TEST	Passed/Failed	FINAL TEST AFTER REPAIR	Passed/Failed
DOUBLE CHECK VALVE ASSEMBLY:	_____/_____	DOUBLE CHECK VALVE ASSEMBLY:	_____/_____
1ST CHECK held in direction of flow ____PSID (1 or more)	_____/_____	1ST CHECK held in direction of flow ____PSID (1 or more)	_____/_____
2ND CHECK held backpressure	_____/_____	2ND CHECK held backpressure	_____/_____
2ND CHECK held in direction of flow ____PSID (1 or more)	_____/_____	2ND CHECK held in direction of flow ____PSID (1 or more)	_____/_____
NO. 2 SHUTOFF VALVE leak tight	_____/_____	NO. 2 SHUTOFF VALVE leak tight	_____/_____
NOTE: FAILURE OF ANY OF THE ABOVE ITEMS REQUIRES REPAIR			

COMMENTS

REPAIR HISTORY

THE ABOVE REPORT IS CERTIFIED TO BE TRUE, ACCURATE AND COMPLETE

TESTED BY (PRINT) (SIGNATURE)	REPAIRED BY (PRINT) (SIGNATURE)
COMPANY	FINAL TEST BY (PRINT) (SIGNATURE)

CERTIFICATION NUMBER	OWNER OR OWNER'S REPRESENTATIVE	DATE

Appendix F

Director of Codes Administration's Response

Department of Codes Administration

DATE: August 16, 1999

TO: Mark Funkhouser, City Auditor

FROM: J. Barry Archer, P.E., CBO, Director

SUBJECT: DCA response to Draft of Backflow Prevention Follow-up Audit Report

I have reviewed with my staff the Draft of Backflow Prevention Follow-up Audit Report attached to your memo dated August 12, 1999. Thank you for the opportunity to comment.

I agree with the recommendation to verify if there is a single form that can be used by certified backflow prevention testers to report to either department as required by the Code of Ordinances. DCA will gladly work with the Department of Water Services to review current forms and develop a new form if needed. We will also review our common procedures to ensure that the two departments are not performing redundant activities on this issue. As the Code of Ordinances Section 18-111, 603.3.2.3, establishes the lines of responsibility regarding the approval of backflow preventors, as well as the information that is required to be reported on the certification forms, there should not be an opportunity for rejection of a report by two different departments.

To help clarify the respective roles of DCA and DWS, I will summarize the lines of responsibility per Ordinance as follows. For all new installations, repairs or relocations performed as required by and under the authority of a DCA-issued plumbing permit in accordance with Code of Ordinances Chapter 18, DCA is responsible for approval. The certification form shall be sent to DCA for review and approval. These devices are typically located inside the building, but could be located outside the building (wherever the point of cross connection occurs on the customer's water distribution system.) These forms are then forwarded to DWS for the purpose of updating their database of testable devices within the City.

For all installations of backflow preventors on a building service line as required by Code of Ordinances Chapter 78, DWS shall permit and inspect the installation. The certification form shall be sent to DWS for review and approval. These devices may be located either outside or immediately inside the building wall in accordance with Code of Ordinances Section 78-298. In addition, all certification forms for annual tests are sent directly to DWS.

Please review references found on pages 7, 11-12, and 19 of the draft report in light of the above comments.

I hope that you found Codes Administration staff courteous and cooperative during this project as well. Please contact me if I may provide any additional information.